

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MURATA MACH LTD

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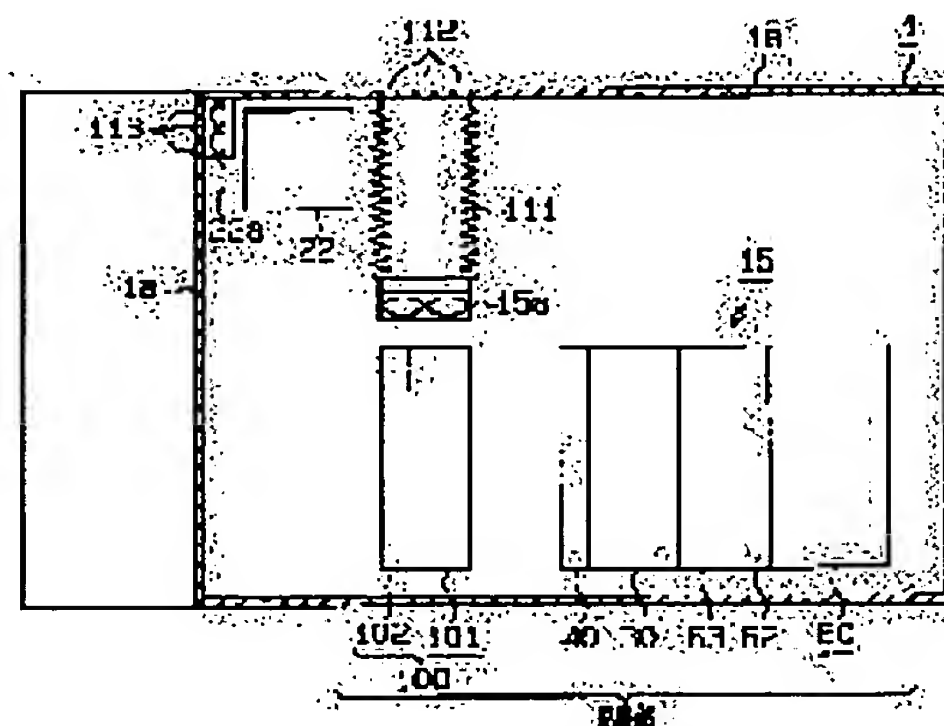
(72)Inventor : NISHIZAWA AKINORI

## (54) IMAGE FORMING DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide the image forming device which achieves noise reduction and power saving without decreasing heat-release efficiency.

**SOLUTION:** When a recording process in a recording part 15 is finished, a power-source fan 22a, disposed on a sidewall composing a housing for a facsimile device 1, that is, further outside than the middle in the facsimile device 1, is rotated at a low speed. Conversely when the recording process is not resumed by a specific time (for example, 25 [minutes]) elapses after the recording process, the rotation of a fixing-unit fan 15a, disposed on the middle side in the facsimile device 1, and the rotation of the power-source fan 22a are stopped. Therefore, without decreasing the heat-release efficiency, the noise reduction and power saving can be achieved.



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**CLAIMS**

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[Claim(s)]

[Claim 1] After record process killing in two or more cooling means to cool the inside of equipment, a record means to record an image on the recording paper, and a record means is image formation equipment equipped with the control means which carries out low-speed control of the cooling means arranged more outside among two or more cooling means.

[Claim 2] After record process killing [ in / on image formation equipment according to claim 1 and / in a control means / a record means ] and predetermined time progress are image formation equipment made to stop two or more cooling means of all.

[Claim 3] It is image formation equipment which is that to which the cooling means by which low-speed control is carried out cools a power supply section after record process killing in image formation equipment according to claim 1 or 2, and other cooling means cool a record means.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the image formation equipment which forms an image using an electrophotography method.

[0002]

[Description of the Prior Art] In recent years, in image formation equipment, the method which records an image on the recording paper using an electrophotography method is used abundantly. The image-formation equipment of this electrophotography method is equipped with the electrification machine which generally electrifies the front face of a photo conductor uniformly, the photographic filter which irradiates light and forms an electrostatic latent image in the front face of a photo conductor, the development counter which the toner supplied to that electrostatic latent image from a toner case is made to adhere, and forms a toner image, the imprint machine which imprints that toner image on the recording paper, and the heating fixing assembly which fix the imprinted toner image to the recording paper.

[0003] By the way, the calorific value generated from a heating fixing assembly for the sake of the convenience which has adopted the method to which the toner image imprinted by the recording paper is fixed by heating and pressurization with the image formation equipment of an electrophotography method is very large. In addition, the calorific value from the power supply section which supplies the high voltage (for example, -1.2 [kV]) to an electrification machine cannot be disregarded, either. For this reason, the wall surface of the case which holds each above-mentioned device etc. was usually equipped with the cooling fan, and the inside of a case is cooled.

[0004]

[Problem(s) to be Solved by the Invention] However, although it is desirable to always rotate a cooling fan at full speed in order to raise heat dissipation effectiveness while cooling the inside of a case, on the other hand, there is a problem of the noise generated from a cooling fan. In addition, when full speed rotation of the cooling fan is always carried out, there is also a problem that power consumption becomes large.

[0005] This invention is made paying attention to such a trouble, and the purpose is in offering the possible image formation equipment of attaining quiet-izing and power-saving, without reducing heat dissipation effectiveness.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, in invention according to claim 1, after record process killing in two or more cooling means to cool the inside of equipment, a record means to record an image on the recording paper, and a record means was equipped with the control means which carries out low-speed control of the cooling means arranged more outside among two or more cooling means.

[0007] In invention according to claim 2, after record process killing [ in / in a control means / a record means ] and predetermined time progress stop two or more cooling means of all in image formation equipment according to claim 1.

[0008] In invention according to claim 3, in image formation equipment according to claim 1 or 2, the cooling means by which low-speed control is carried out cools a power supply section after record process killing, and other cooling means cool a record means.

[0009] In addition, in the gestalt of implementation of invention described below, "image formation equipment"

given in a claim or The means for solving a technical problem is equivalent to facsimile apparatus 1, similarly a "cooling means" is equivalent to fan 22 for fixing dextrous fan 15a and power sources a, similarly the Records Department 15 deserves a "record means", and, similarly a "control means" is equivalent to MPU11, ROM12, and RAM13.

[0010]

[Embodiment of the Invention] Below, 1 operation gestalt which materialized the image formation equipment concerning this invention to facsimile apparatus is explained using a drawing.

[0011] As shown in drawing 1, while facsimile apparatus 1 consists of MPU11, ROM12, RAM13, a read station 14, the Records Department 15, a control unit 16, a display 17, an image memory 18, a codec 19, a modem 20, NCU21, and a power supply section 22, each part 11-22 is connected through the bus 23, respectively.

[0012] MPU11 controls each part which constitutes facsimile apparatus 1. ROM12 memorizes the program for controlling facsimile apparatus 1. RAM13 memorizes the various information about facsimile apparatus 1 temporarily.

[0013] A read station 14 reads the image data on a manuscript, and outputs a monochrome binary image data. The Records Department 15 consists of a printer of an electrophotography method, and records the drawing data of the manuscript read by the received drawing data or the read station 14 in the record paper in record actuation and copy actuation of receiving drawing data. Moreover, it has fixing dextrous fan 15a for cooling the Records Department 15 and the heating fixing assembly mentioned especially later. In addition, this heating fixing assembly is begun and it mentions later about the detail of the Records Department 15.

[0014] A ten key for a control unit 16 to input the telephone number etc. (\* and the # key are included), The start key for making the compaction key for sending from registration of an abbreviated number, and an abbreviated number, and reading actuation of a manuscript start, It has various actuation keys, such as an image quality setting key for setting communication link/copy key for setting up "communication link (FAX)" actuation or "copy" actuation, and the image quality at the time of reading as a "criterion", "high definition", and "super-high definition." The display 17 which consists of LCD etc. displays various information which shows the operating state of facsimile apparatus 1 etc.

[0015] An image memory 18 is read and made binary by receiving drawing data or the read station 14, and the drawing data by which compression coding was carried out by the codec 19 are memorized temporarily. A codec 19 is encoded according to MH, MR, a MMR method, etc. for transmission of the drawing data read by the read station 14 (encoding). Moreover, a codec 19 decodes receiving drawing data (decoding).

[0016] A modem 20 performs the modulation and recovery of a transmitted and received data according to V.17, V.27ter, or V.29 grade based on the facsimile transmission control procedures according to ITU-T recommendation T.30. NCU21 is equipped with the function for detecting sending out and arrival of a dial signal corresponding to a phase hand's telephone number etc. while it controls connection with the telephone line L. The power supply section 22 supplies all the power for operating each part of facsimile apparatus 1. Moreover, the power supply section 22 has fan 22a for power sources for cooling oneself.

[0017] Next, the concrete configuration is explained to a detail about the Records Department 15 according to a record process. As shown in drawing 2, the photo conductor drum 30 as a photo conductor is supported to revolve pivotable, and the photoconductive layer 31 is formed in the peripheral face.

[0018] The electrification machine 40 consists of brush rollers which implanted the conductive brush object, and makes predetermined potential carry out uniform electrification of the photoconductive layer 31 of the photo conductor drum 30. A photographic filter 50 consists of LED arrays 51, irradiates light and forms an electrostatic latent image in the photoconductive layer 31 of the photo conductor drum 30.

[0019] The development counter unit 60 is equipped with the toner case 61 where a toner is held, the feed roller 62, to which it is arranged at the lower part within the toner case 61, and a predetermined electrical potential difference is supplied, and the developing roller 63 with which it is arranged at lower limit opening of the toner case 61, and a predetermined electrical potential difference is supplied so that it may be located between the feed roller 62 and photo conductor drum 30. This electrostatic latent image adheres to the toner to which it was conveyed from the toner case 61, and predetermined potential was given by these feed rollers 62 and the developing roller 63 alternatively according to the difference of the given potential and potential of the above-mentioned electrostatic latent image formed on the photo conductor drum 30. With the toner adhering to this



electrostatic latent image, a toner image is formed on the photo conductor drum 30.

[0020] In the toner case 61, the agitator body 64 is supported to revolve pivotable. The toner within the toner case 61 is always agitated by rotation of this agitator body 64, and a toner is maintained at a uniform consistency.

[0021] The recording paper 71 of predetermined size is held in the recording paper cassette 70 in the state of the laminating. A roller 74 sends out at a time one sheet of topmost recording paper 71 held in the recording paper cassette 70 for a half moon. And the sent-out recording paper 71 is transported toward the photo conductor drum 30. In addition, the alternate long and short dash line P shows the migration path of the recording paper 71.

[0022] The imprint machine 90 is arranged by the lower part of the photo conductor drum 30, and is controlled by predetermined potential. And the imprint machine 90 imprints the toner image on the photo conductor drum 30 on the recording paper 71 based on the difference of the predetermined potential and potential of a toner image.

[0023] The memory removal brush 91 consists of a conductive brush, disturbs the toner which remains on the photo conductor drum 30 after an imprint, and distributes it uniformly on the photo conductor drum 30. The heating fixing assembly 100 consists of a heating roller 101 and a pressurization roller 102, and is arranged in the recording paper sending area of the photo conductor drum 30. Lamp 101a (for example, halogen lamp) for maintaining the heating fixing assembly 100 to predetermined temperature is built in the interior of a heating roller 101. And the heating fixing assembly 100 carries out heating fixing of the toner image on the recording paper 71 based on the recording paper 71 being sent in between a heating roller 101 and the pressurization roller 102.

[0024] In addition, in this operation gestalt, a series of processes of electrification to the photo conductor drum 30 explained above, exposure, development and the imprint to the recording paper 71, and heating fixing are the record processes of one unit.

[0025] Drawing 3 shows typically the planar structure of the facsimile apparatus 1 including the Records Department 15. As shown in this drawing, near the heating fixing assembly 100, fixing dexterous fan 15a for cooling the heating fixing assembly 100 is arranged. The end of a duct 111 is connected to fixing dexterous fan 15a, and the other end is connected to the exhaust port 112 formed in side-attachment-wall 1a which constitutes the case of facsimile apparatus 1. On the other hand, fan 22a for power sources is near the power supply section 22, and is attached in the exhaust port 113 prepared in side-attachment-wall 1a which constitutes the case of facsimile apparatus 1. Rotational speed is controlled by the electrical potential difference to which fixing dexterous fan 15a and fan 22a for power sources are supplied from a power supply section 22.

[0026] Next, actuation of fixing dexterous fan 15a and fan 22a for power sources is explained using the flow chart shown in drawing 4. In addition, in this flow chart, actuation of those other than a user is performed by control of MPU11 based on the program memorized by ROM12.

[0027] In S11, it is judged whether the record process in the Records Department 15 was completed. When the record process is completed, it shifts to S13. On the other hand, when the record process is not completed, it shifts to S12.

[0028] In S12, since the record process in the Records Department 15 is continued, a predetermined electrical potential difference (for example, 24 [V]) is supplied to fixing dexterous fan 15a and fan 22a for power sources from a power supply section 22, and fixing dexterous fan 15a and fan 22a for power sources rotate at full speed. That is, fixing dexterous fan 15a and fan 22a for power sources rotate at full speed until the record process of one unit is completed.

[0029] On the other hand in S13 which the record process ended, the electrical potential difference supplied to fan 22a for power sources from a power supply section 22 descends on a predetermined electrical potential difference (for example, 17 [V]), and fan 22a for power sources rotates at a low speed.

[0030] And in S14, it is judged after low-speed control of fan 22a for power sources based on actuation or facsimile reception of the control unit 16 by the user by the time predetermined time (for example, 25[part]) passes etc. whether the record process was resumed. By the time predetermined time passes, when a record process is resumed, it returns to S11. On the other hand, by the time predetermined time passes, when a record process is not resumed, it shifts to S15.

[0031] In S15, the electric power supply from a power supply section 22 to fixing dexterous fan 15a and fan 22a

for power sources is stopped, and rotation of fixing dexterous fan 15a and fan 22a for power sources is suspended.

[0032] As mentioned above, as explained in full detail, according to this operation gestalt, the following operations and effectiveness can be acquired.

(1) When the record process in the Records Department 15 is completed, fan 22a for power sources which was arranged in side-attachment-wall 1a which constitutes the case of facsimile apparatus 1 and which was arranged outside the center in facsimile apparatus 1 when putting in another way rotates at a low speed. That is, after a record process is completed, the electric power supply from a power supply section 22 to the electrification machine 40, a feed roller 62, a developing roller 63, and imprint machine 90 grade is stopped, and electrification of the photo conductor drum 30 is also suspended. Moreover, formation of the electrostatic latent image by the photographic filter 50 is also suspended. That is, since it is in the condition to which the calorific value from a power supply section 22 also became small, fan 22a for power sources is rotated at a low speed. Therefore, quiet-izing and power-saving can be attained, without reducing heat dissipation effectiveness.

[0033] (2) After a record process is completed before predetermined time (for example, 25[part]) passes, when a record process is not resumed, rotation of fixing dexterous fan 15a arranged in facsimile apparatus 1 and said fan 22a for power sources is suspended. For this reason, only while the heating fixing assembly 100 is performing heating fixing to the recording paper 71, if it puts in another way, only while the calorific value from the heating fixing assembly 100 is large, fixing dexterous fan 15a will rotate at full speed. That is, since the heating fixing assembly 100 and the power supply section 22 are also cooled below at predetermined temperature when a record process is not resumed, after a record process is completed before predetermined time passes, fixing dexterous fan 15a and fan 22a for power sources are stopped. Therefore, quiet-izing and power-saving can be attained further, without reducing heat dissipation effectiveness.

[0034] (3) Within facsimile apparatus 1, fixing dexterous fan 15a is arranged near the heating fixing assembly 100 with the largest calorific value among each part which constitutes the Records Department 15, and generation of heat from the heating fixing assembly 100 is emitted out of facsimile apparatus 1 using a duct 111. For this reason, the noise generated from fixing dexterous fan 15a which rotates for a long time is controlled. Therefore, quiet-ization can be attained further.

[0035] Furthermore, before generation of heat from the heating fixing assembly 100 is spread in facsimile apparatus 1, it can emit out of facsimile apparatus 1. therefore, facsimile apparatus -- the heating fixing assembly 100 with the largest calorific value can be efficiently cooled in 1 among each part which constitutes especially the Records Department 15.

[0036] (4) Since fan 22a for power sources arranged in side-attachment-wall 1a which constitutes the case of facsimile apparatus 1 gives priority to quiet-ization, it is making record process killing and coincidence carry out low-speed rotation. On the other hand, since fixing dexterous fan 15a arranged in the interior of facsimile apparatus 1 gives priority to cooling, it is stopping with fan 22a for power sources after predetermined time progress from record process killing. For this reason, quiet-ization can be attained further.

[0037] (5) The Records Department 15, fixing dexterous fan 15a for cooling especially the heating fixing assembly 100, and fan 22a for power sources for cooling a power supply section 22 were made to become independent, respectively, and are prepared. For this reason, fixing dexterous fan 15a and fan 22a for power sources are controlled separately, and the thing of them can be carried out. Therefore, according to the situation of the Records Department 15 of operation, or the temperature in facsimile apparatus 1, fixing dexterous fan 15a and fan 22a for power sources are controllable according to an individual.

[0038] In addition, it changes as follows and this operation gestalt can also take shape.

- In the aforementioned operation gestalt, although two fans, i.e., fixing dexterous fan 15a, and fan 22a for power sources were arranged in equipment in order to cool the inside of equipment, three or more fans may be arranged in equipment. Thus, even when constituted, about at least one fan arranged more outside, the effectiveness according to said operation gestalt can be acquired by giving priority to quiet-ization and making record process killing and coincidence carry out low-speed rotation.

[0039] - The recording paper sensor (illustration abbreviation) which detects passage of the recording paper 71 may be arranged in the sending area of the heating fixing assembly 100, and you may make it the configuration which judges record process killing based on the detecting signal from the recording paper sensor.

[0040] - The silence member (for example, glass wool) which has a silencing effect in the inner skin of a duct

111 may be made to form. If it does in this way, quiet-ization can be attained further. Furthermore, technical thought other than the claim grasped from the above-mentioned operation gestalt is indicated with those effectiveness below.

[0041] [1] Image formation equipment which emits generation of heat in equipment out of equipment in image formation equipment according to claim 3 using a conveyance means from the cooling means arranged in the central site from that in equipment.

[0042] In addition, in said operation gestalt, a "conveyance means" given in the above [1] is equivalent to a duct 111. Thus, if constituted, it will be muffled in case the noise generated from a cooling means passes a conveyance means. Therefore, quiet-ization can be attained further.

[0043] [2] Image formation equipment which attached the silence member in the conveyance means in claim 3 or image formation equipment given in the above [1]. Thus, if constituted, quiet-ization can be attained further.

[0044]

[Effect of the Invention] Since this invention is constituted as mentioned above, it does the following effectiveness so. According to invention according to claim 1, quiet-izing and power-saving can be attained, without reducing heat dissipation effectiveness.

[0045] According to invention according to claim 2, quiet-izing and power-saving can be attained further, without reducing heat dissipation effectiveness in addition to effectiveness according to claim 1. According to invention according to claim 3, in addition to effectiveness according to claim 1 or 2, according to the situation of a record means of operation, a cooling means is controllable according to an individual.

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[Translation done.]

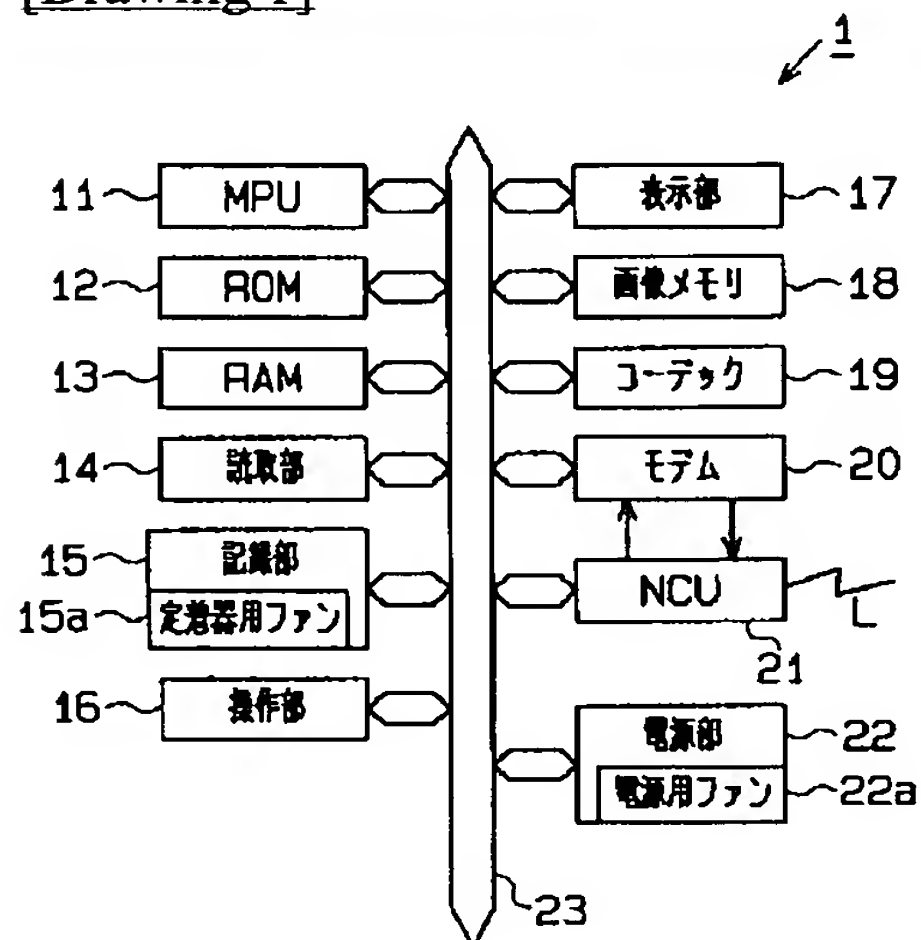
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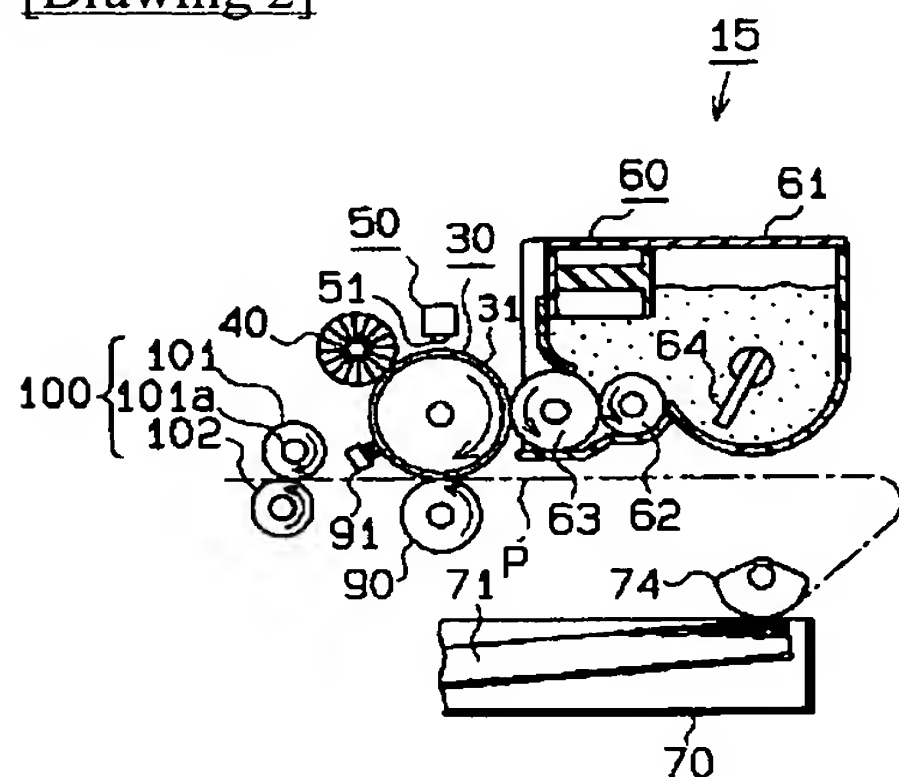
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## DRAWINGS

[Drawing 1]

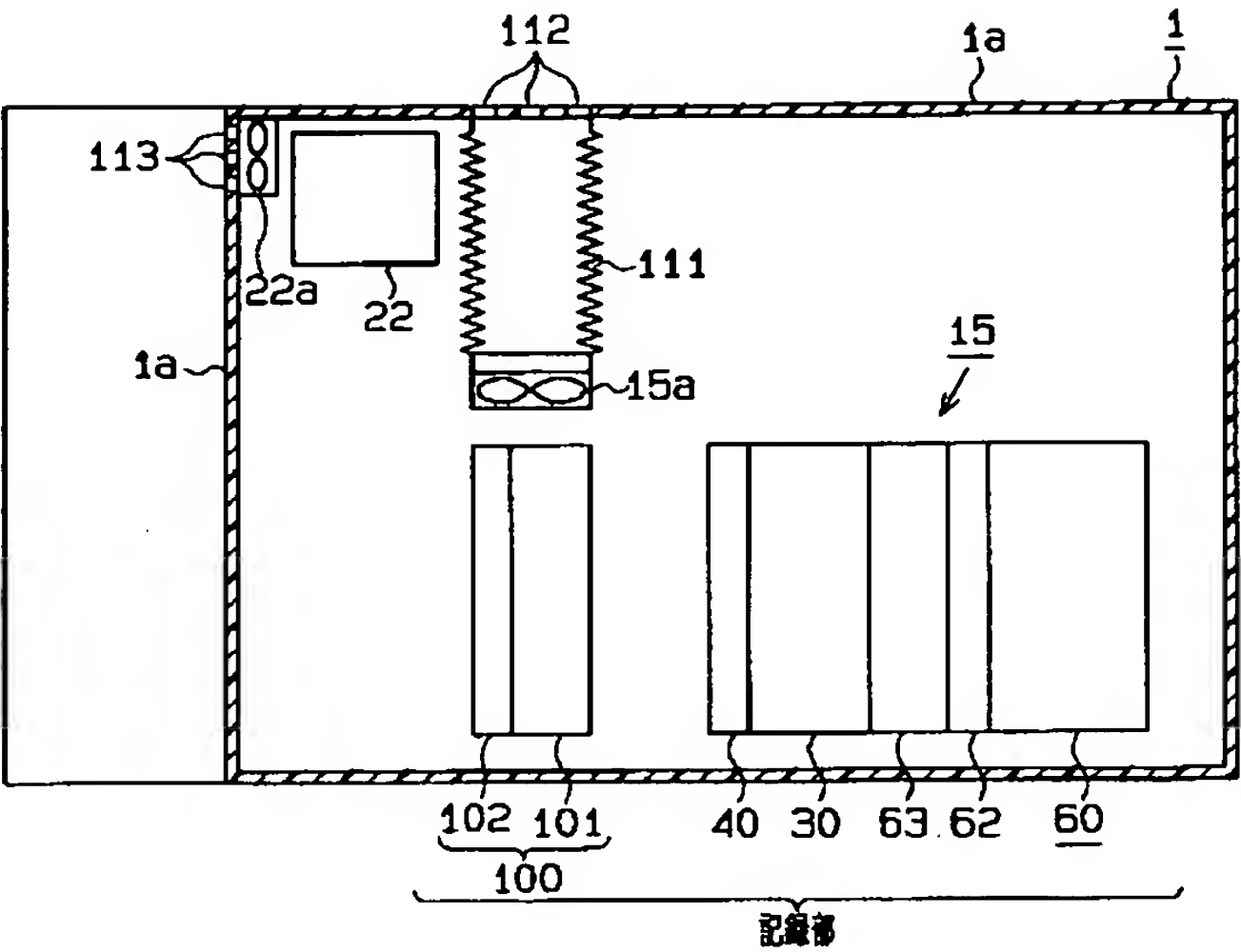


[Drawing 2]

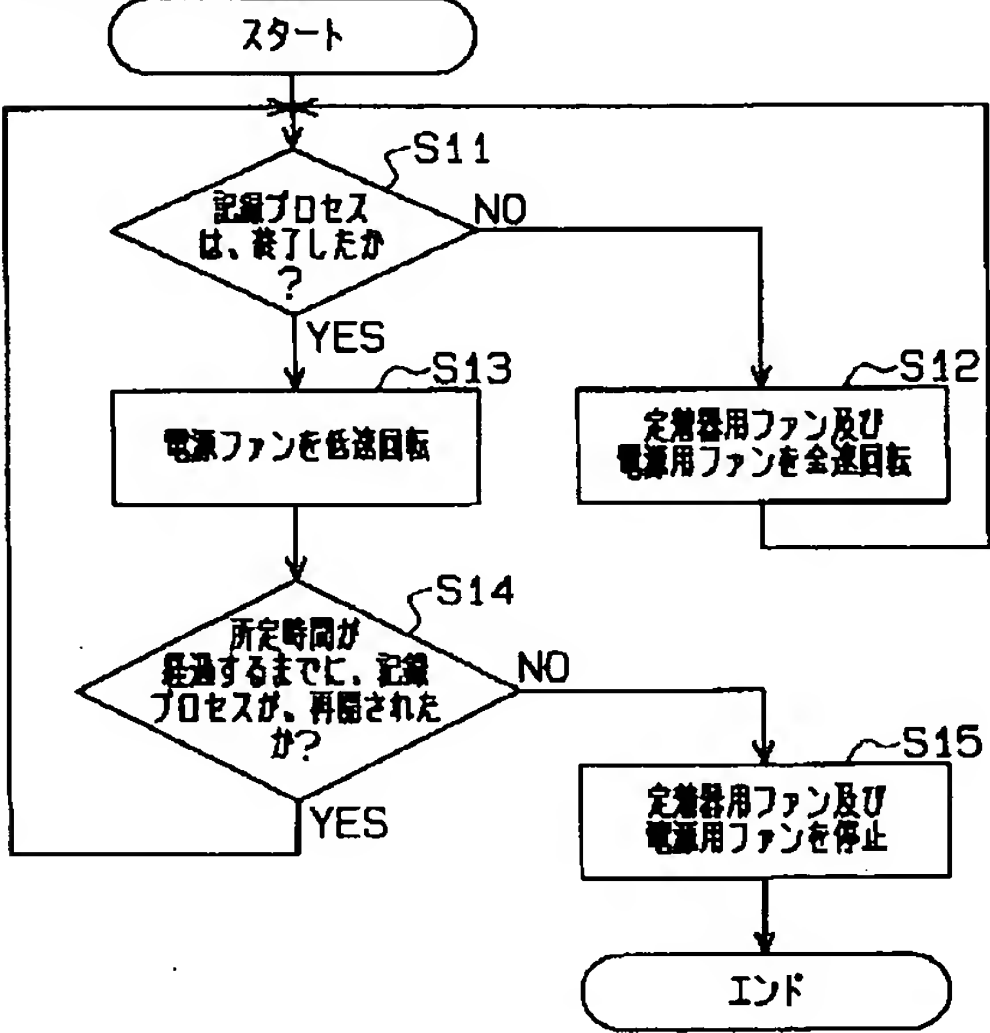


[Drawing 3]





[Drawing 4]



[Translation done.]